



Research report

The impact of goal attainment on behavioral and mediating variables among low income women participating in an Expanded Food and Nutrition Education Program intervention study[☆]

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ABSTRACT

This study examined the relationships between participant goal attainment and changes in mediating variables and food choice outcomes from a modified curriculum for the Texas Expanded Food and Nutrition Education Program (EFNEP) promoting healthy home food environments and parenting skills related to obesity prevention. EFNEP participants in 54 intervention classes received a goal sheet after each of 6 classes. Participants recorded goal attainment and returned at the next class. Diet and mediating variables were measured at baseline, immediate post, and 4 months later. Mixed model regression analysis over time assessed whether goal attainment was associated with the outcomes at post or follow-up, controlling for baseline assessment. Participants who reported attaining more goals reported greater self-efficacy for planning/encouraging fruit and vegetable consumption and making fruit and vegetables available, menu planning skills, improvement in the food preparation practices and higher home availability for regular vegetables. At post, those who reported attaining more fiber, vegetable, and water goals reported consuming more of these items. Goal attainment was related to some changes in food choice and mediating variables in an at risk population. Further research into the use and efficacy of goal setting and attainment in this population is warranted.

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Introduction

Obesity is a serious problem in the United States for both children and adults (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010) and is associated with both medical (Finkelstein, Trogdon, Cohen, & Dietz, 2009) and economic costs (Finkelstein, French, Variyam, &

Haines, 2004; Hampl, Carroll, Simon, & Sharma, 2007; Wang & Dietz, 2002). The Expanded Food and Nutrition Education Program (EFNEP), sponsored by the US Department of Agriculture, provides food and nutrition education to limited-resource families, who often have high rates of obesity (Bennett, Wolin, & James, 2007; Ogden et al., 2010; Wang & Dietz, 2002). An obesity prevention component to EFNEP classes was developed through formative research with Texas EFNEP clients (Thompson, Cullen, Lara-Smallling, Scott, & Konzelmann, submitted for publication), and was recently evaluated (Cullen et al., 2009). Based on EFNEP client feedback during development, the Social Cognitive Theory (SCT) constructs of modeling, self-control, self-efficacy, behavioral skills, and the environment were incorporated into each of the six intervention classes (Bandura, 1986; Thompson et al., submitted for publication). Self-control was operationalized as the ability to attain goals, which enables individuals to select and focus on a behavior to improve (Bandura, 1986; Thompson et al., 2007). Fig. 1 shows the conceptual framework for the Building Healthy Families intervention and the goal setting component. The intervention achieved reductions in BMI for the intervention participants at the

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end of the 8-week program, but these results were not maintained 4 months later (Cullen et al., 2009).

While many dietary and physical activity behavior programs include goal setting to guide the behavior change process, there are few published papers that investigate the contribution of goal attainment to outcomes (Cullen, Baranowski, & Smith, 2001). A review published in 2004 investigated the use of goal setting in dietary and physical activity behavior change interventions (Shilts, Horowitz, & Townsend, 2004). Of the 28 studies met inclusionary criteria, only 13 of 23 adult studies examined the effectiveness of goal setting and 8 of these showed positive effects on diet and physical activity behaviors (Shilts et al., 2004). However, the relationship between goal attainment and outcomes were not reported. No such studies were found for children and adolescents.

More recent research also supports the positive impact of goal setting. Goal setting was related to self-efficacy, commitment and intention about attaining goals, as well as changes in goal-related physical activity for adults in a 12-week workplace intervention promoting physical activity (Dishman, DeJoy, Wilson, & Vandenberg, 2009). Goals for pedometer steps and weekly minutes of physical activity increased during the intervention, as did the actual pedometer steps and minutes of activity reported by intervention participants (Dishman, Vandenberg, Motl, Wilson, & DeJoy, 2009). Middle school students who attempted goal setting reported greater improvements in dietary behavior and physical activity behavior after the intervention, compared to the students who did not use goal setting (Shilts, Horowitz, & Townsend, 2009). For high school girls, having a goal for physical activity mediated the paths between self-efficacy and intention and intention and perceived behavioral control (Dishman et al., 2006).

A program with fourth grade children analyzed the impact of goal attainment in each session on fruit and vegetable intake (Cullen, Zakeri, et al., 2004), as well as the influence of attaining goals for preparing recipes (Cullen, Watson, Zakeri, Baranowski, & Baranowski, 2007). Complex relationships were detected; results depended on baseline fruit and vegetable preferences and consumption. For example, children with low baseline fruit and juice preferences who reported attaining more fruit-juice consumption goals reported greater fruit-juice intake at post assessment (Cullen, Zakeri, et al., 2004). For boys and those with high baseline fruit, juice, and vegetable (FJV) consumption, attaining three general goals was associated with higher FJV consumption (Cullen, Zakeri, et al., 2004). Students with the highest baseline vegetable consumption who achieved two or three vegetable recipe preparation goals reported the highest post vegetable consumption (Cullen et al., 2007).

This manuscript focuses on the impact of goal attainment on the changes in diet and mediating variables for the intervention clients in the EFNEP study (Cullen et al., 2009). Based on the goal setting literature, it was hypothesized that successful goal attainment would be positively related to successful intervention outcomes. Intervention clients who attained more intervention goals would report greater positive changes on home availability and consumption of fruit, vegetables, and low fat milk products, and significant improvements in menu planning skills, parent self-efficacy, home food preparation practices, and barriers to healthy eating compared to intervention clients who attained fewer goals.

Methods

This study was approved by the Institutional Review Board at Baylor College of Medicine, Houston, Texas. Extension agents in three Texas cities recruited 100 EFNEP classes between February, 2006 and March, 2007, for this study. Research staff in Houston used a random numbers table to assign classes to intervention (54) or control (46) condition, by city. The Texas EFNEP has 6 weekly

sessions and three data collection class sessions were added for this study: baseline (session 1), post (session 8), plus a 4-month follow-up session. Two EFNEP teachers in each city were trained to deliver the modified curriculum and 2 to 4 other staff were trained for data collection. The EFNEP class teachers recruited clients from these 100 classes to participate in measurement activities. All participants provided written informed consent and received a small gratuity (\$20) for each data collection. About 88% of the clients registered for the classes provided consent; there were between 5 and 24 clients in each class. The intervention was considered usual practice because it covered the basic EFNEP materials in the usual class. The six EFNEP classes were conducted during weeks 2–7 for all 100 classes. Details on intervention development (Thompson et al., submitted for publication) and the evaluation study outcomes (Cullen et al., 2009), are presented elsewhere.

The six-session Texas EFNEP class topics presented to the adult clients were (1) nutrition basics and portion size, (2) breakfast and snacks, (3) fruit and vegetables, (4) dairy and meat, (5) breads and grains, and (6) smart shopping. An intervention video, developed for the study, was inserted into the 60 min class. In the video, a fictitious EFNEP class was observed dealing with the home food and eating issues covered in each class session. The video class members discussed problems food and feeding their family members, and modeled the use of problem solving and goal setting to overcome those problems. At the end of the class, clients received preprinted weekly goal sheets with the assigned goals for the week (Table 1), and used a problem solving mnemonic (TALK) to discuss potential barriers to achieving their goals. The letters represented “Think of the solutions,” “Ask others for help,” “Look at all the ideas,” and “Keep the ones that might work for you and try them out.” The discussion led to solutions to overcome the barriers that the participants believed would interfere with goal attainment. Participants were asked to monitor goal attainment using the goal sheet and to return the goal sheet in class the following week. At the beginning of each class, there was a brief discussion about the previous week’s goal success; problems meeting goals were identified and class participants shared solutions. The goal sheets were collected. Only intervention condition participants took part in goal setting and problem solving.

Measurements

Goal attainment. Goal attainment was recorded from the goal sheets returned by the participants each week. Research staff coded “yes” or “no” for each goal attained, as recorded by the participant. The average percentage of goals attained (%goals attained) was obtained by dividing the total number of goals attained by the total number of goals for each class, and then averaged across all classes.

Diet. One 24-h dietary food record was completed with the standard EFNEP class protocol at each data collection class. These records were entered into Nutrition Data System for Research (version 2007; Nutrition Coordinating Center, University of Minnesota) for analysis. Daily consumption of total energy, percent of energy from fat and saturated fat, fiber, servings of fruit, juice and regular vegetables (non-fried), and ounces of milk (whole, 2% and low fat/fat free), sweetened beverages and water were obtained. These dietary variables are related to the content of the 6 sessions and the participant goals.

Parental influences. The questionnaires assessing parental influences were evaluated for construct validity in previous research using exploratory factor analysis (Cullen et al., 2000; Cullen, Klesges, et al., 2004). Concurrent validity was established with correlational analyses with related constructs and behaviors (Cullen et al., 2000; Cullen, Klesges, et al., 2004). Parent self-

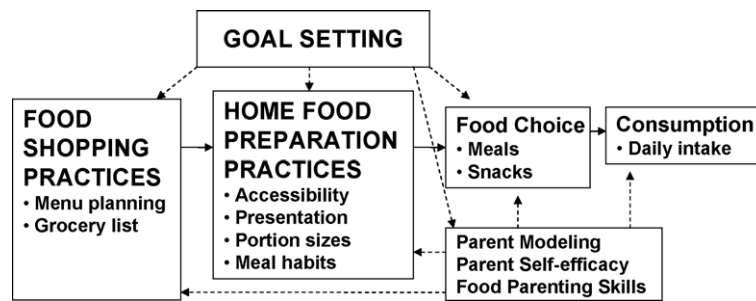


Fig. 1. Conceptual framework relating the goal setting component to the Building Healthy Families intervention.

efficacy to help child eat a healthy diet was measured with 21 questions that formed three subscales: self-efficacy for planning and serving fruit and vegetables (FV), self-efficacy for modeling FV consumption, and self-efficacy for making FV available/accessible (Cullen et al., 2000). Planning self-efficacy was positively correlated with fruit consumption in a previous study (Cullen et al., 2000). Baseline internal consistency coefficients in this study were 0.69–0.84 (Cullen et al., 2009).

Menu planning and grocery shopping practices were measured using a 9-item scale with two subscales, menu planning skills and child influences on shopping (Cullen et al., 2000). Baseline internal consistency values of the subscales for this study were 0.68 and 0.75, respectively (Cullen et al., 2009). Women receiving Food Stamps who reported more careful shopping skills were more likely to report higher quality diets (Hersey et al., 2001). Among an economically diverse group of women, only about 10% planned weekly meals before shopping, and about 33% used a shopping list (Crawford, Ball, Mishra, Salmon, & Timperio, 2007). However, women who practiced these behaviors reported higher FV intakes (Crawford et al., 2007).

Family barriers to eating FV and low fat foods was assessed with a 14-item questionnaire with adequate reliability (Cullen et al., 2000). Fruit and vegetable intakes were significantly negatively correlated with home FV barriers in previous research (Cullen et al., 2000). Both of the subscales, barriers related to family consumption of FV and low fat foods, had baseline internal consistency of 0.84 (Cullen et al., 2009).

Family food preparation practices were assessed with a 26-item questionnaire (Cullen, Klesges, et al., 2004; Kristal, Shattuck, & Henry, 1990). The 5 subscales (meat modification to reduce fat, reduced fat foods, substitution of low fat for high fat foods, improve FV practices, and reduce sugary foods) had baseline internal consistency coefficients from 0.41 to 0.65 in this study (Cullen et al., 2009). In a previous study, girls' intake of fat as a percentage of energy was positively related to parental high-fat food preparation practices and negatively related to low-fat food preparation practices (Cullen, Klesges, et al., 2004).

Home availability of fruit, juice, vegetables, high-, low- and fat-free foods was assessed with instruments used in previous research (Cullen et al., 2000; Cullen, Baranowski, Rittenberry, et al., 2001; Cullen, Klesges, et al., 2004). Internal consistency for the FV, low-fat, and high-fat food availability scales were 0.77, 0.59 and 0.64, respectively, in previous research. Children's fruit and vegetable intake was significantly positively correlated with fruit and vegetable home availability (Cullen et al., 2000; Cullen, Baranowski, Rittenberry, et al., 2001; Cullen, Klesges, et al., 2004).

Statistical analyses

Higher scores on all the scales reflect more healthful behaviors. Means and standard deviations were used to describe the %goals attained. The mixed model repeated measures analysis was conducted to see if goal attainment was associated with the parental influences outcomes at post or follow-up as a main effect or interaction. Then the same analysis was conducted using the specific goals for fiber, fruit/juice, regular vegetables, low fat/fat free milk, and water with their respective dietary consumption variables. To aid in interpretation, the standardized regression coefficients from the mixed regression model for each time period were used to demonstrate the strength of the relationship. Although the standardized regression coefficient is only equal to the correlation in a simple linear regression model, it may be interpreted as being similar to the correlation. All models controlled for baseline values (age, ethnicity, number of children and adults in the home and participation in federal nutrition programs) and the random effect of class. A significant main effect for %goals attained represented significant associations between the outcome and the percentage of goals attained, regardless of time. Significant main effects (noted in the tables as "g") were not interpreted in the presence of significant interactions (noted in the tables as "gt"). Because the relationships were of interest, similar to correlational analysis, level of significance was not adjusted. All analyses were performed using SAS version 9.2.

Results

Participants. There were 54 intervention classes with approximately 11 participants per class. After excluding 56 pregnant baseline participants and those who did not participate in post or

Table 1
The means and standard deviations for percentage of goals met recorded from the participants' goal sheets.

Goal	M (SD)
Overall	50.7% (0.23.6%)
Daily	
Class 1: Nutrition basics and portion size	48.3% (36.8%)
Served the right amount of food?	
Class 2: Breakfast and snacks	56.1% (35.0%)
Served breakfast?	
Chose a healthy snack?	
Served water instead of sweet drinks?	
Class 3: Fruit and vegetables	49.5% (35.9%)
Served 2 or more fruits?	
Served 3 or more vegetables?	
Class 4: Dairy and meat	51.1% (40.4%)
Served low fat milk?	
Tried low fat recipe?	
Class 5: Breads and grains	39.2% (38.4%)
Serve high fiber food 1	
Serve high fiber food 2	
Serve high fiber food 3	
Weekly	
Class 6: Smart shopping	59.8% (56.1%)
Checked store food ads?	
Planned menus?	
Made grocery list?	

follow-up data collection, there were 372 participants (64%) in the analyses. There was only one difference noted between participants included and excluded in the analysis. Fewer of the excluded participants were Hispanic (85%), compared with the 92% of the participants in the analysis. Most participants (97%) were women, with a mean age of 35.6 (± 9.5) years, and 2.5 (± 1.2) children (≤ 18 years of age) in the home. The average percentage of goals attained was 50.7% ($\pm 23.6\%$) and ranged from a low of 39.2% ($\pm 38.4\%$) in the class on serving high fiber foods in Class 5 to a high of 59.8% ($\pm 56.1\%$) in the class on checking store food ads, planning menus, and making grocery lists in Class 6 (Table 1).

Parental influences outcomes. The standardized regression coefficients were significant for self-efficacy for planning/encouraging FV consumption and making FV available, menu planning skills, low fat food barriers, meat modification to reduce fat, substitution of low fat for high fat foods, FV practices, and reduce sugary foods (Table 2). Significant main effects for goal attainment were found for two of the parent self-efficacy subscales and menu planning skills (Table 2). Parents who reported attaining more goals reported greater self-efficacy for planning/encouraging FV consumption and making FV available, and greater menu planning skills ($p < 0.05$ for all).

Greater goal attainment was significantly associated with improvement in the following food preparation practices: meat modification to reduce fat, reduced fat foods, improve FV practices, and reduce sugary foods ($p < 0.05$ for all). There was a significant time by %goals attained interaction for the substitution of low fat for high fat subscale ($p < 0.05$). Parents with greater goal attainment reported more low fat food substitutions at post.

There was only one significant association for the home food availability questionnaire. Those who reported greater attainment also reported higher home food availability for regular vegetables ($p < 0.05$).

Table 2

Results from linear mixed model analyses of the average number of goals between psychosocial and availability scale outcomes and the average number of goals met.

	Standardized regression coefficient (Std RC)			
	Post		Follow-up	
	Std RC	n	Std RC	n
Parent self-efficacy ¹				
Modeling FV consumption	0.09	335	0.03	243
Planning/encouraging FV consumption [§]	0.11 [*]	335	0.03	244
Making FV available ^{§*}	0.11 [*]	335	0.07	243
Menu planning ²				
Menu planning skills ^{§*}	0.10 [*]	335	−0.02	243
Child shopping influence	−0.01	330	−0.02	243
Food barriers ²				
FV consumption barriers	0.06	331	−0.04	241
Low fat food barriers	0.11 [*]	330	0.00	241
Family food preparation practices ¹				
Meat modifications ^{§*}	0.11 [*]	335	0.08	244
Reduced fat ^{§*}	0.07	335	0.10	244
Substitution ^{§***, §*}	0.21 ^{***}	334	0.05	244
FV practices ^{§*}	0.11 [*]	334	0.10	244
Sugary food reduction ^{§*}	0.11 [*]	332	0.09	244
Home food availability ³				
Fruit and 100% fruit juice	0.05	335	−0.03	244
Regular vegetables ^{§*}	0.08	335	0.10	244
Low fat/fat free milk	0.05	335	0.06	244
2% fat milk	0.05	335	0.06	244
Whole milk	−0.05	335	0.07	244

Scale range: ¹scale 0–2; ²scale 0–3; ³scale 0–1.

Significant Std RC from linear mixed regression model stratified by time at $p < .05$ (*), $p < .01$ (**), $p < .001$ (***).

Table 3

Results from linear mixed model analyses of the food specific number of goals attained regressed onto dietary consumption outcomes.

Variable	Standardized regression coefficient (Std RC)			
	Post		Follow-up	
	Std RC	n	Std RC	n
Food specific number of goals				
Fiber ^{§*}	0.08	323	0.10	223
Fruit and 100% juice (servings)	0.09	323	0.05	223
Regular vegetables (servings) ^{§**}	0.12 [*]	323	0.12	223
Low fat/fat free milk (ounce)	−0.01	323	0.12	223
Water (ounce) ^{§*}	0.18 ^{**}	323	0.13 [*]	223

Significant Std RC from linear mixed regression model stratified by time at $p < .05$ (*), $p < .01$ (**), $p < .001$ (***).

Dietary consumption outcomes. There were a total of 869 food records for the three data collection points; less than 1% were from a weekend day. Goals for regular vegetables and water were significantly correlated with regular vegetable and water consumption at post, and the relationship for water was also significant at follow-up (Table 3).

Significant main effects for goal attainment were found for fiber, regular vegetables and water (Table 3). Those who attained more fiber goals, reported consuming more fiber. Attaining more vegetable and water goals was associated with greater consumption of vegetables and water.

Discussion

Whether goal attainment enhances behavior change is an important research question. In this study, goal attainment reported after each of the 6 intervention sessions was used in analyses to determine if successful goal attainment among the intervention participants was related to healthier food choices and improvements in the mediating variables associated with the family food and eating experience.

Overall, participants reported attaining about 51% of the 14 goals. The goals for serving high fiber foods appeared to be the most difficult to achieve (39.2% of goals achieved), while the goals associated with smart shopping were the most likely to be attained (59.8% of goals achieved) (Table 1). The high goal attainment for the smart shopping goals might reflect the immediate economic benefits the participants believe connected with these goals. EFNEP program evaluations have documented reduced food expenditures by clients (Burney & Houghton, 2002). However, few adults eat enough whole grain foods; only 6–8% of adults met the recommendation in national surveys (Cleveland, Moshfegh, Albertson, & Goldman, 2000; Good, Holschuh, Albertson, & Eldridge, 2008). While fewer participants attained the fiber goals, those who did reported greater fiber intake. The intervention addressed barriers to fiber consumption such as problems with identifying whole grain foods and limited availability in stores (Adams & Engstrom, 2000; Burgess-Champoux, Marquart, Vickers, & Reicks, 2006; Jetter & Cassady, 2006; Kantor, Variyam, Allshouse, Putnam, & Lin, 2001), cost (Jetter & Cassady, 2006; Kantor et al., 2001), and taste (Adams & Engstrom, 2000; Burgess-Champoux et al., 2006; Kantor et al., 2001). Future research should address these barriers, particularly in a low income population. Perhaps longer interventions or booster sessions are needed in order for families to increase whole grain food purchase and intake.

In this study greater general goal attainment was associated with higher home availability of regular vegetables, and greater parental self-efficacy for planning/encouraging FV consumption

and making FV available, menu planning skills, and healthy food preparation practices. The process from food shopping to consumption is highlighted in Fig. 1. Influences on these processes were addressed in the intervention video, and in the class discussions that occurred during the sessions (Campbell & Desjardins, 1989; Golan, 2006; Lindsay, Sussner, Kim, & Gortmaker, 2006), and improvements in these variables should support a healthy home food environment. Food shopping practices of EFNEP participants were significantly associated with nutrient consumption and the nutrients available in the foods used by households during 1 week (Hersey et al., 2001). Past EFNEP evaluation studies have also shown significant improvements in client meal planning and shopping skills compared to nonparticipants (Burney & Haughton, 2002). Future longitudinal research is needed to assess whether changes in these skills lead to long-term improved family dietary behaviors.

Attainment of the goals for regular vegetables and water were also related to improved intakes (Table 3). The increased water consumption may be related to the reduction in BMI noted in the evaluation study (Cullen et al., 2009). Perhaps the mothers in this study did improve their skills for serving fruit, vegetables, and low fat/fat free milk, but the home food environment scale and the 24-h recall were not sensitive enough to detect the change. Although the questionnaires were developed and tested with diverse mothers (Cullen et al., 2000), there might have been unknown issues with comprehension in this group of mothers. Future research should include cognitive testing of the questionnaires. Assessment of children's dietary behaviors in the home should also be included.

Several other limitations should be noted. In this study, the goals were preset; the participants did not get to choose their own goals. Goals that are self-selected or set participatively may be preferred because the participants choose goals that are specific to their needs (Latham & Yukl, 1975; Locke & Latham, 1994). Significant results have been found for patients who were able to choose their own diet or physical activity goals (Estabrooks et al., 2005). However, goals assigned with a rationale (why goal is desirable and/or achievable) were also acceptable (Latham & Yukl, 1975). In this study, the goals were discussed in each class and participants could relate the goal to the class lesson. Varying the type of goal selection (self-selected, collaborative, directed) is an important topic for future research.

All participant diet and psychosocial questionnaire data were self-reported. Memory and portion size estimation are potential problems for dietary data, as is underreporting. Very few food records were for weekend days, which could bias results. However, the EFNEP staff received an initial intensive training as well as periodic booster training sessions. Social desirability of response was not assessed and could have biased results. The classes were randomized and both groups received an intervention, so issues with differential social desirability between groups should be minimized. Plus intervention and data collection staff were different, eliminating issues with bias during data collection. All participants were primarily Hispanic and from Texas, limiting generalizability. Finally, the participants motivational state and reasons for attending these classes were not assessed.

Implications for research and practice

The findings in this study document positive outcomes from attaining behavior change goals associated with the psychosocial and environmental influences on food choice behavior. The intervention goal setting component in each class supported the lesson and participants' efforts to improve their home food environment and family food choices. Attainment of the weekly goals enabled the participants to practice these important

behaviors, increase self-efficacy (Bandura, 1986), and incorporate them into usual practice. Goals provide a target for change and continued research into the use and efficacy of goal setting in diverse populations and for multiple behaviors is warranted.

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